

CLAIMS

1. A fluorescent protein described in the following (a) or (b):
 - (a) a protein having the amino acid sequence shown in SEQ ID NO: 1; or
 - (b) a protein, which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 1, which has fluorescence properties equivalent to those of the protein having the amino acid sequence shown in SEQ ID NO: 1, and which exists in the form of a monomer.
2. A fluorescent protein described in the following (a) or (b):
 - (a) a protein having the amino acid sequence shown in SEQ ID NO: 3, 5, 7 or 9; or
 - (b) a protein, which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 3, 5, 7 or 9, and which has fluorescence properties equivalent to those of the protein having the amino acid sequence shown in SEQ ID NO: 3, 5, 7 or 9, respectively.
3. A fluorescent protein described in the following (a) or (b):
 - (a) a protein having the amino acid sequence shown in SEQ ID NO: 11, 13, 15, 17, 19, 21, 23, 25, 27 or 29; or
 - (b) a protein, which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 11, 13, 15, 17, 19, 21, 23, 25, 27 or 29, and which has fluorescence properties equivalent to those of the protein having the amino acid sequence shown in SEQ ID NO: 11, 13, 15, 17, 19, 21, 23, 25, 27 or 29, respectively.
4. DNA encoding a fluorescent protein described in the following (a) or (b):
 - (a) a protein having the amino acid sequence shown in SEQ ID NO: 1; or
 - (b) a protein, which has an amino acid sequence comprising a deletion, substitution,

and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 1, which has fluorescence properties equivalent to those of the protein having the amino acid sequence shown in SEQ ID NO: 1, and which exists in the form of a monomer.

5. DNA encoding a fluorescent protein described in the following (a) or (b):

(a) a protein having the amino acid sequence shown in SEQ ID NO: 3, 5, 7 or 9; or

(b) a protein, which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 3, 5, 7 or 9, and which has fluorescence properties equivalent to those of the protein having the amino acid sequence shown in SEQ ID NO: 3, 5, 7 or 9, respectively.

6. DNA encoding a fluorescent protein described in the following (a) or (b):

(a) a protein having the amino acid sequence shown in SEQ ID NO: 11, 13, 15, 17, 19, 21, 23, 25, 27 or 29; or

(b) a protein, which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 11, 13, 15, 17, 19, 21, 23, 25, 27 or 29, and which has fluorescence properties equivalent to those of the protein having the amino acid sequence shown in SEQ ID NO: 11, 13, 15, 17, 19, 21, 23, 25, 27 or 29, respectively.

7. DNA described in the following (a) or (b):

(a) DNA having the nucleotide sequence shown in SEQ ID NO: 2; or

(b) DNA, which has a nucleotide sequence comprising a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in SEQ ID NO: 2, and which has a nucleotide sequence encoding a protein that has fluorescence properties equivalent to those of the protein encoded by the nucleotide sequence shown in SEQ ID NO: 2 and that exists in the form of a monomer.

8. DNA described in the following (a) or (b):

- (a) DNA having the nucleotide sequence shown in SEQ ID NO: 4, 6, 8 or 10; or
- (b) DNA, which has a nucleotide sequence comprising a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in SEQ ID NO: 4, 6, 8 or 10, and which has a nucleotide sequence encoding a protein that has fluorescence properties equivalent to those of the protein encoded by the nucleotide sequence shown in SEQ ID NO: 4, 6, 8 or 10, respectively.

9. DNA described in the following (a) or (b):

- (a) DNA having the nucleotide sequence shown in SEQ ID NO: 12, 14, 16, 18, 20, 22, 24, 26, 28 or 30; or
- (b) DNA, which has a nucleotide sequence comprising a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in SEQ ID NO: 12, 14, 16, 18, 20, 22, 24, 26, 28 or 30, and which has a nucleotide sequence encoding a protein that has fluorescence properties equivalent to those of the protein encoded by the nucleotide sequence shown in SEQ ID NO: 12, 14, 16, 18, 20, 22, 24, 26, 28 or 30, respectively.

10. A recombinant vector having the DNA according to any one of claims 4 to 9.

11. A transformant having the DNA according to any one of claims 4 to 9 or the recombinant vector according to claim 10.

12. A fusion fluorescent protein, which consists of the fluorescent protein according to any one of claims 1 to 3 and another protein.

13. The fusion protein according to claim 12, wherein another protein is a protein that localizes in a cell.

14. The fusion protein according to claim 12 or 13, wherein another protein is a protein specific to a cell organella.

15. The fusion protein according to claim 12, wherein another protein is a fluorescent protein.

16. The fusion protein according to claim 15, which generates intramolecular FRET.

17. A method for analyzing the localization or dynamics of a protein in a cell, which is characterized in that the fusion protein according to any one of claims 12 to 14 is allowed to express in the cell.

18. A fluorescent reagent kit, which comprises: the fluorescent protein of any one of claims 1 to 3; the DNA of any one of claims 4 to 9; the recombinant vector of claim 10; the transformant of claim 11; or the fusion protein of any of claims 12 to 16.

19. A chromoprotein described in the following (a) or (b):

(a) a protein having the amino acid sequence shown in SEQ ID NO: 37; or

(b) a protein, which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 37, and which has light-absorbing properties.

20. A fluorescent protein described in the following (a) or (b):

(a) a protein having the amino acid sequence shown in SEQ ID NO: 39; or

(b) a protein, which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 39, and which has fluorescence properties.

21. A fluorescent protein described in the following (a) or (b):

(a) a protein having the amino acid sequence shown in SEQ ID NO: 41, 43, 45, or 47; or

(b) a protein, which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 41, 43, 45, or 47, which has fluorescence properties, and which has a stokes shift of 100 nm or greater.

22. DNA encoding a chromoprotein described in the following (a) or (b):

(a) a protein having the amino acid sequence shown in SEQ ID NO: 37; or

(b) a protein, which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 37, and which has light-absorbing properties.

23. DNA encoding a fluorescent protein described in the following (a) or (b):

- (a) a protein having the amino acid sequence shown in SEQ ID NO: 39; or
- (b) a protein, which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 39, and which has fluorescence properties.

24. DNA encoding a fluorescent protein described in the following (a) or (b):

- (a) a protein having the amino acid sequence shown in SEQ ID NO: 41, 43, 45, or 47; or
- (b) a protein, which has an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 41, 43, 45, or 47, which has fluorescence properties, and which has a stokes shift of 100 nm or greater.

25. DNA described in the following (a) or (b):

- (a) DNA having the nucleotide sequence shown in SEQ ID NO: 38; or
- (b) DNA, which has a nucleotide sequence comprising a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in SEQ ID NO: 38, and which has a nucleotide sequence encoding a protein that has light-absorbing properties.

26. DNA described in the following (a) or (b):

- (a) DNA having the nucleotide sequence shown in SEQ ID NO: 40; or
- (b) DNA, which has a nucleotide sequence comprising a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in SEQ ID NO: 40, and which has a nucleotide sequence encoding a protein that has fluorescence properties.

27. DNA described in the following (a) or (b):

- (a) DNA having the nucleotide sequence shown in SEQ ID NO: 42, 44, 46 or 48; or
- (b) DNA, which has a nucleotide sequence comprising a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence shown in

SEQ ID NO: 42, 44, 46 or 48, and which has a nucleotide sequence encoding a protein that has fluorescence properties and has a stokes shift of 100 nm or greater.

28. A recombinant vector having the DNA according to any one of claims 22 to 27.

29. A transformant having the DNA according to any one of claims 22 to 27 or the recombinant vector according to claim 28.

30. A fusion protein, which consists of the protein according to any one of claims 19 to 21 and another protein.

31. The fusion protein according to claim 30, wherein another protein is a protein that localizes in a cell.

32. The fusion protein according to claim 30 or 31, wherein another protein is a protein specific to a cell organella.

33. The fusion protein according to claim 30, wherein another protein is a fluorescent protein.

34. The fusion protein according to claim 33, which generates intramolecular FRET.

35. A method for analyzing the localization or dynamics of a protein in a cell, which is characterized in that the fusion protein according to any one of claims 30 to 32 is allowed to express in the cell.

36. A reagent kit, which comprises: the fluorescent protein of any one of claims 19 to 21; the DNA of any one of claims 22 to 27; the recombinant vector of claim 28; the transformant of claim 29; or the fusion protein of any of claims 30 to 34.